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Mitchell et al.

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- (54) **ADJUSTABLE ANTI-SAG HINGE**
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- (52) **U.S. Cl.**
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- (58) **Field of Classification Search**
USPC 16/238, 236, 245, 248, 309, 312
See application file for complete search history.

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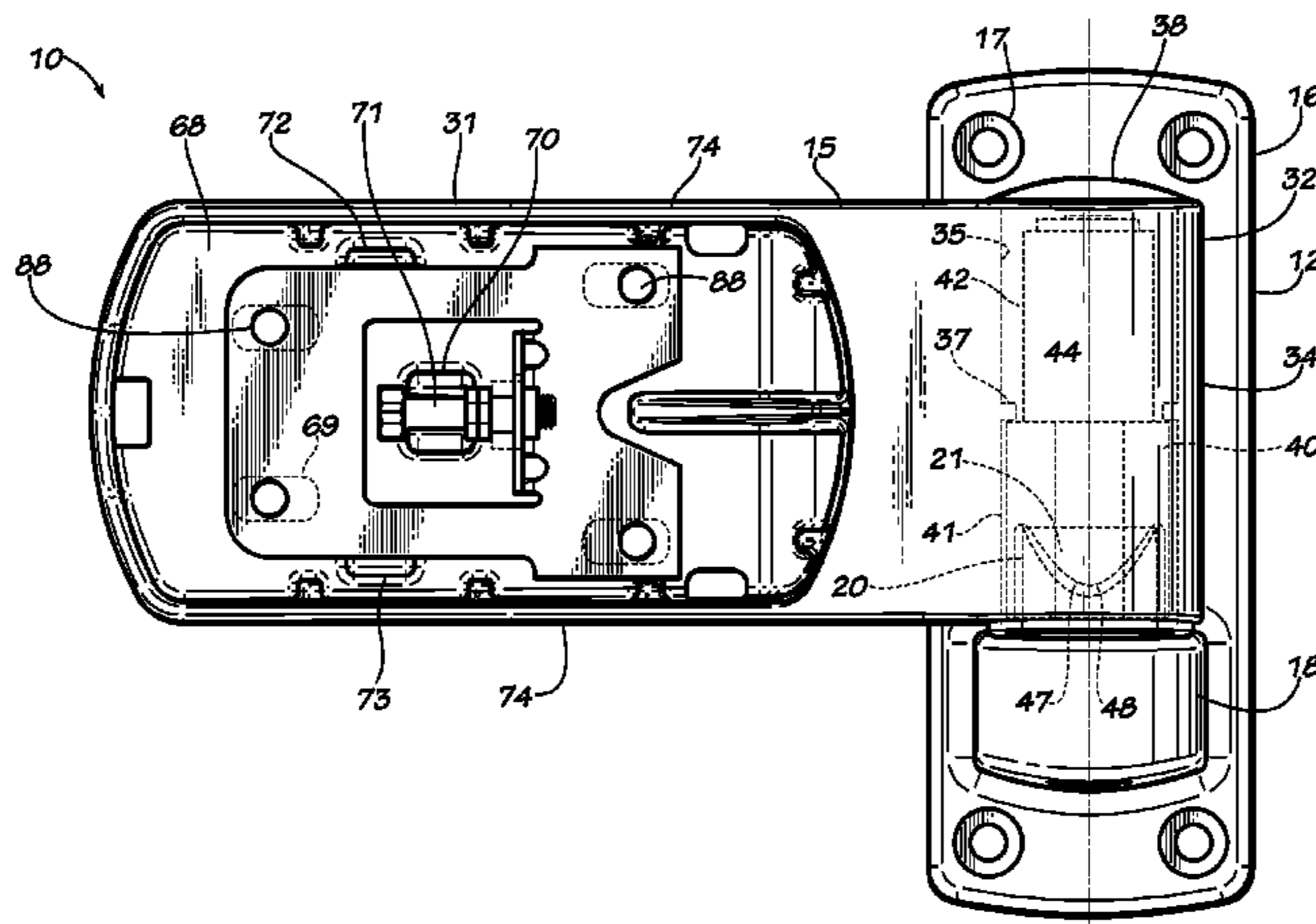
(57) **ABSTRACT**

There is disclosed an anti-sag hinge (10) which includes a mounting flange assembly (12) pivotally coupled to a strap assembly (15). The strap assembly includes a strap (31) extending from a cylinder portion (32). The strap includes elongated mounting holes (69), an adjustment screw boss (70) having a passageway (71), and a moveable adjustment bracket (77) having an adjustment screw mounting flange (78) with a threaded screw hole (79) therein in which is threadably mounted an adjustment screw (80). The adjustment screw has a head (81), a bearing flange (82), a neck (83), and a threaded shaft (84). A removable spacer (86) has a U-shaped gripping portion (87) which is snap fitted onto a portion of the threaded shaft between the bearing flange and the adjustment bracket screw flange. The adjustment bracket includes four mounting holes (88) extending therethrough and generally in alignment with strap elongated mounting holes.

12 Claims, 4 Drawing Sheets

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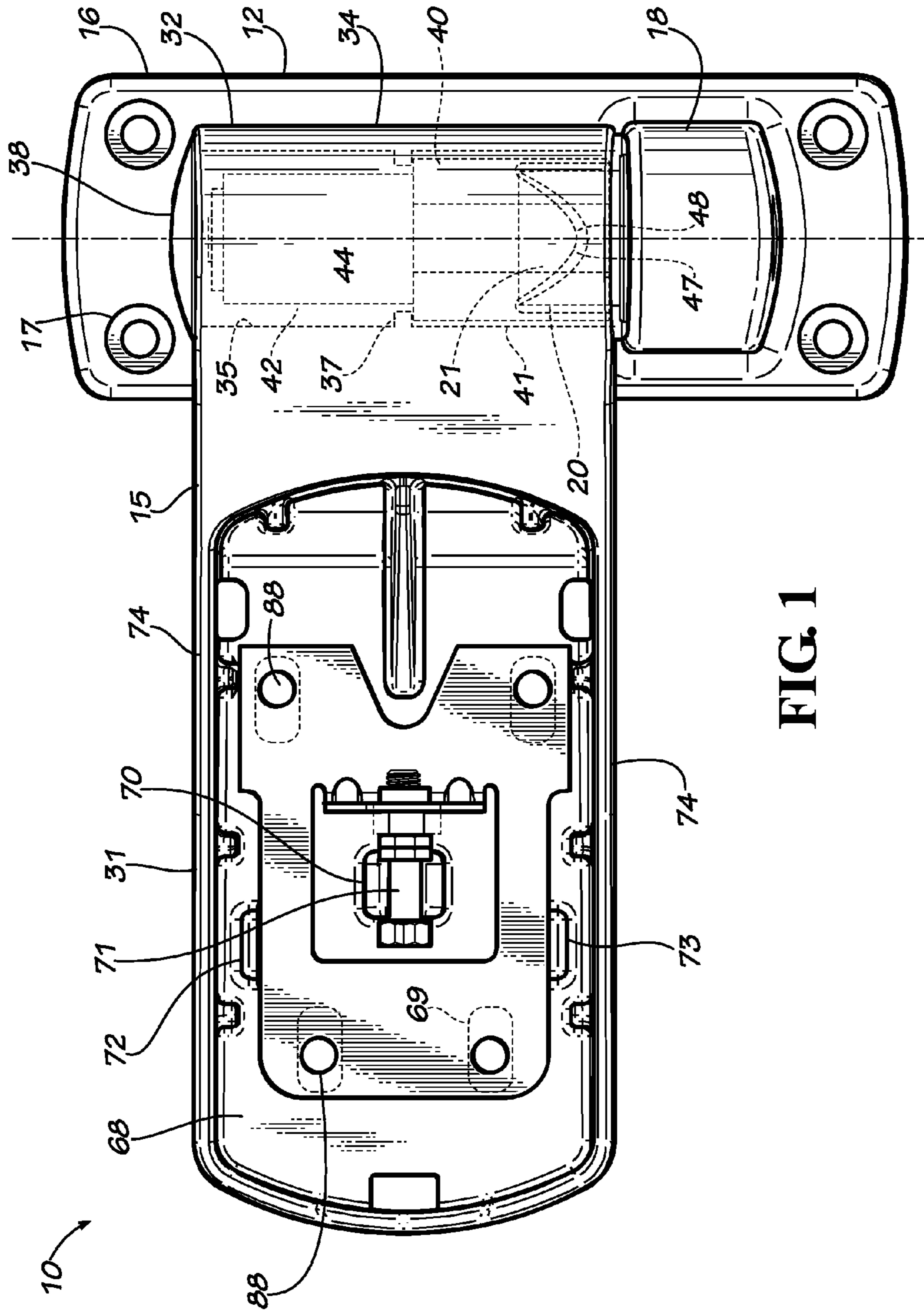


FIG. 1

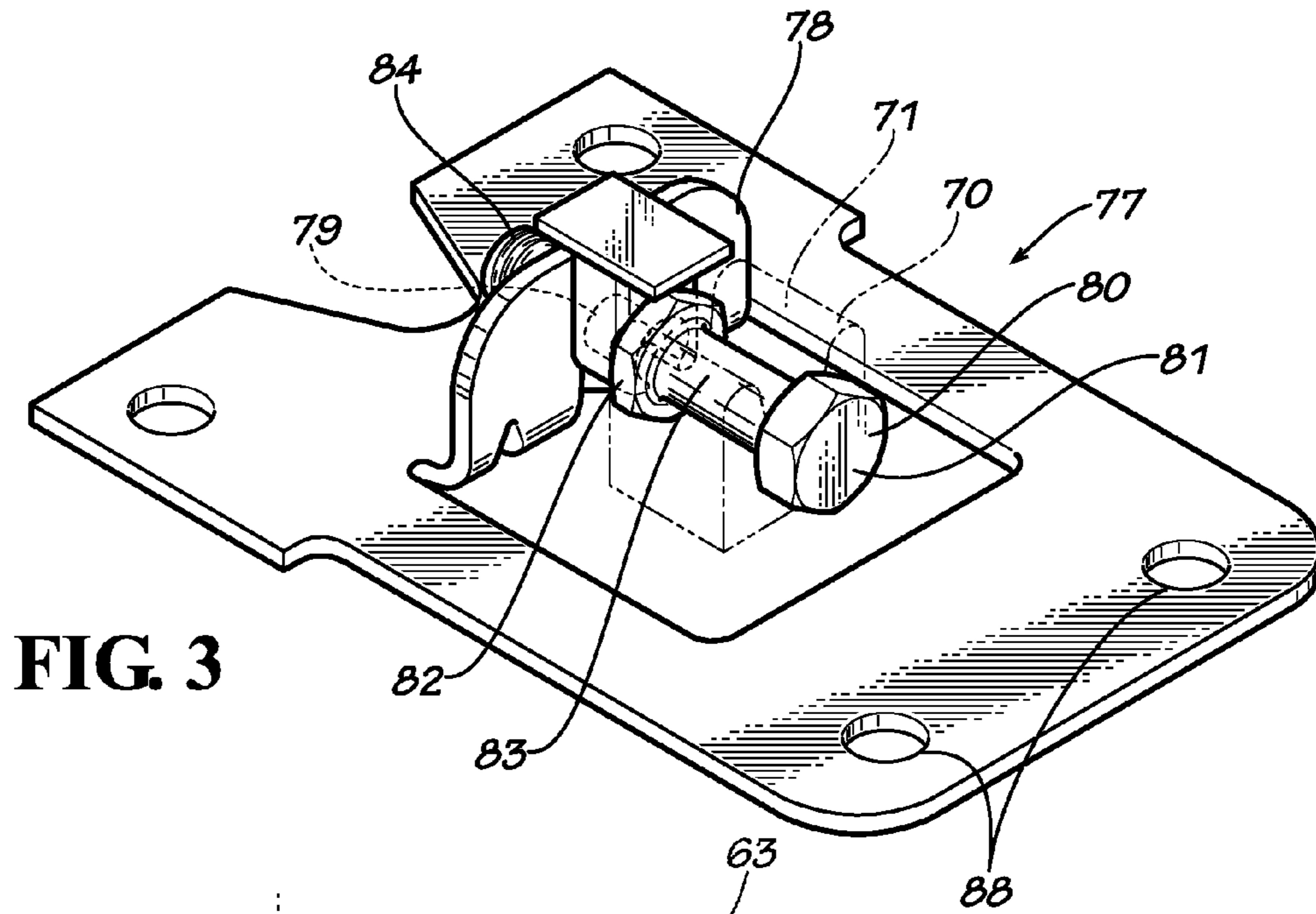


FIG. 3

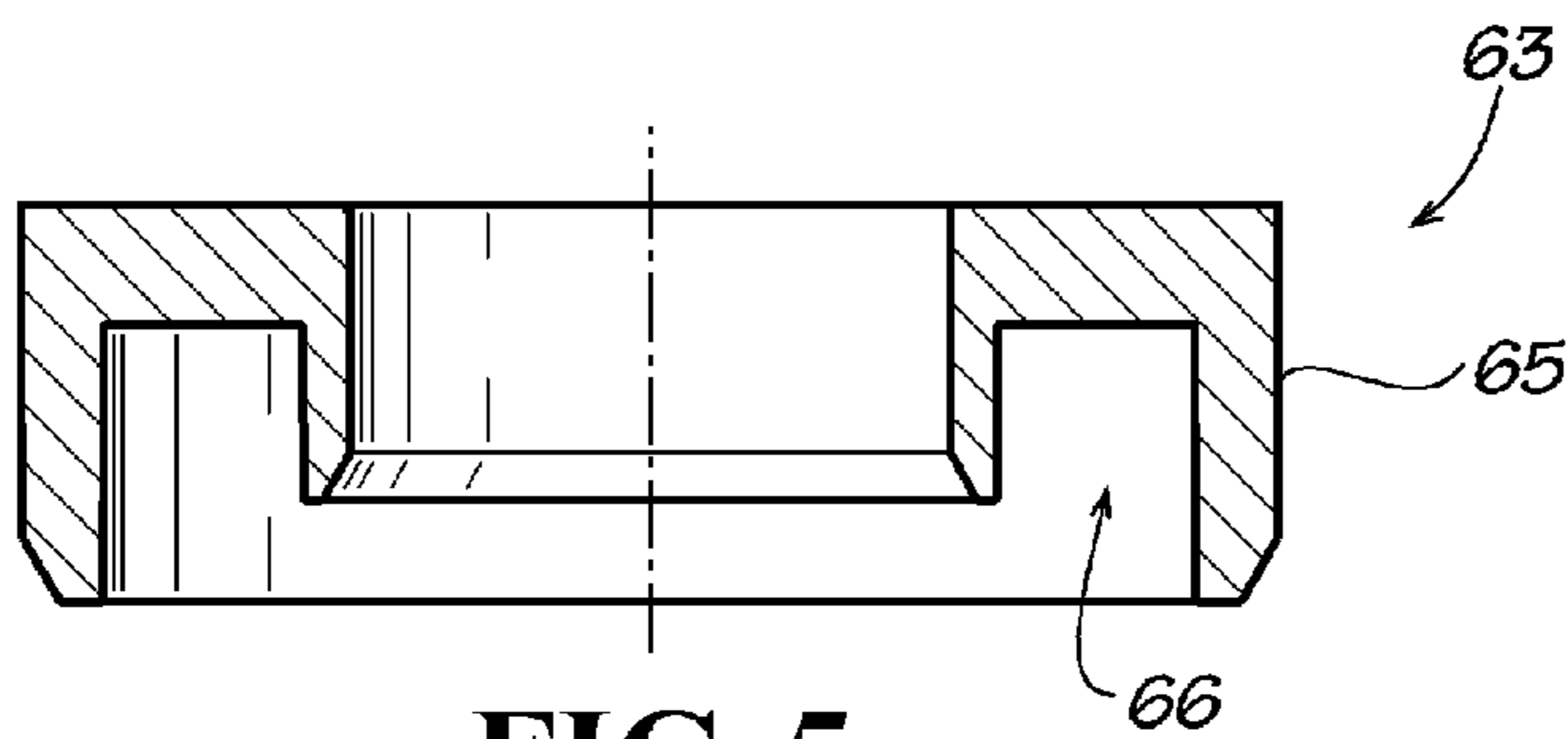


FIG. 5

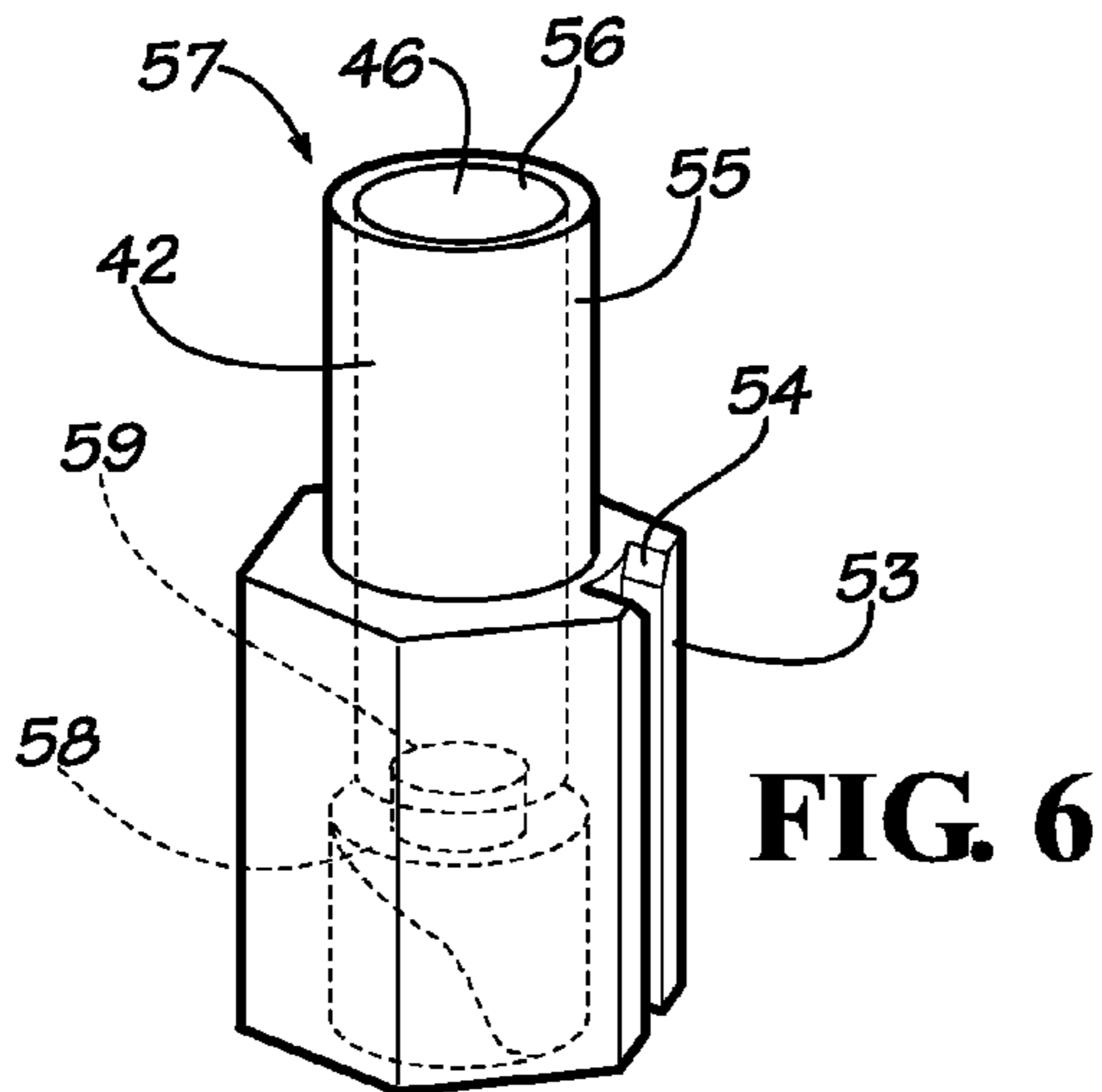


FIG. 6

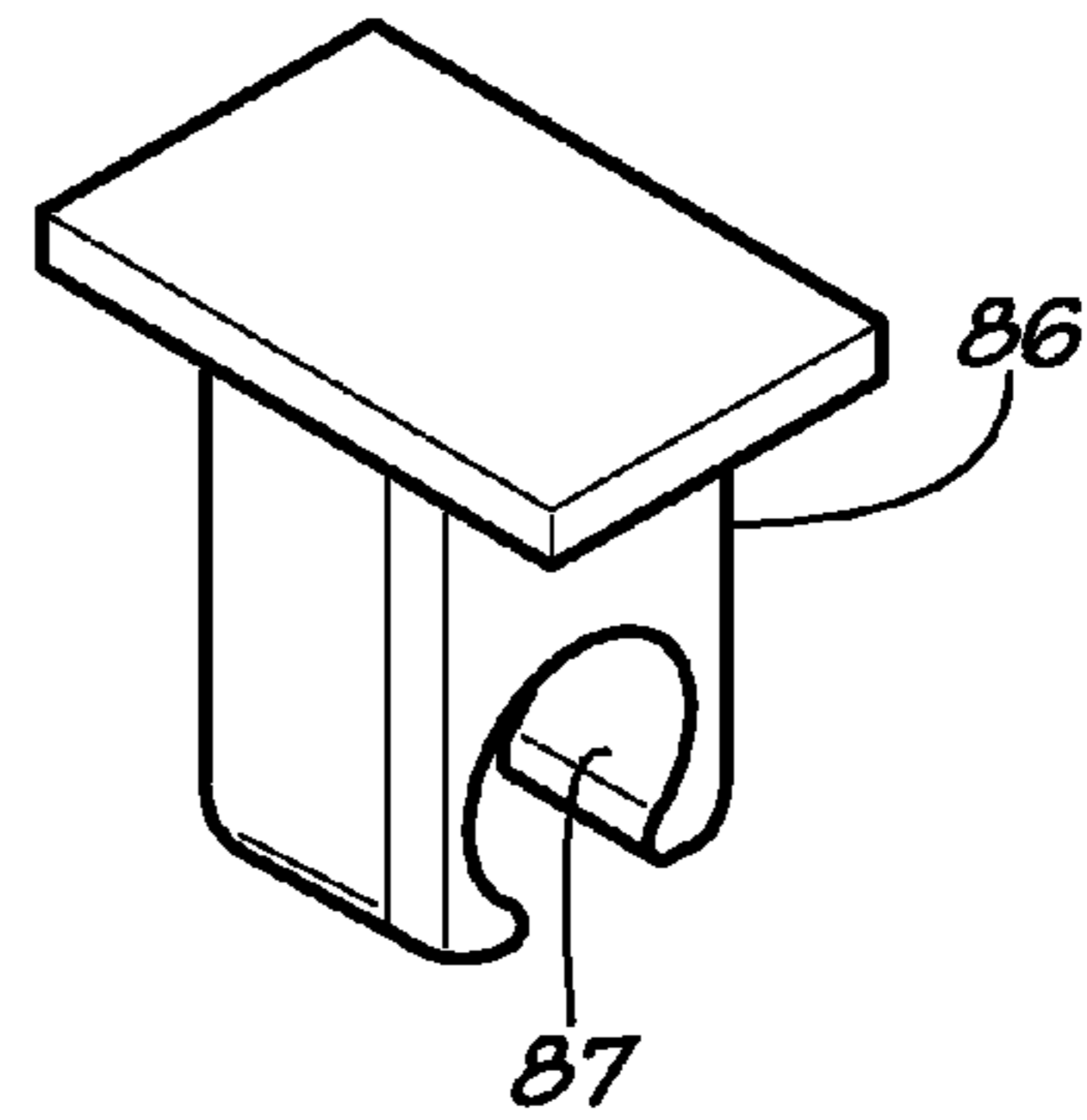


FIG. 7

1**ADJUSTABLE ANTI-SAG HINGE**

TECHNICAL FIELD

This invention relates generally to door hinges, and more particularly to hinges used for commercial refrigerator and freezer doors.

BACKGROUND OF INVENTION

Walk-in cold rooms, such as walk-in coolers, freezers, or other refrigerated environments, are common in various industries, including supermarkets and grocery stores, commercial kitchens, and other food service facilities. They typically have one or more access doors for entry and exit.

These doors are heavy and thus a common problem that may occur over time is door sag, which may cause the door not to open freely as it drags against the underlying floor or be properly locked or sealed as it does not fully close. The sag is caused by hinge wear, structural shifting due to temperature cycling, impacts, abuse, poor design of the door and frame, or the hinges shifting on the mounting screws. Sag is difficult to overcome without extensive repair work, such as the removal and remounting of the hinges or the replacement of the door and frame. For the replacement, adjustment or cleaning of the hinge the NSF prefers that the hinge be a "lift-off" type to allow the door and the enclosure to be cleaned by lifting it off the hinges and hosing down the door assembly.

Accordingly, there is a need in the art for a hinge that will allow for the door to be lifted off easily, which does not promote door sag, and which allows small adjustments to the hinge. It is to the provision of such therefore that the present invention is primarily directed.

SUMMARY OF THE INVENTION

In a preferred form of the invention an anti-sag hinge comprises a mounting flange assembly, and a strap assembly pivotally coupled to the mounting flange assembly. The strap assembly including a strap having at least one strap mounting hole, an adjustment bracket coupled to the strap for relative movement therebetween and having at least one bracket mounting hole alignable with the at least one strap mounting hole, and an adjuster coupled to the strap and the adjustment bracket. The adjuster is capable of varying the position of the adjustment bracket relative to the strap wherein the adjuster includes a first flange extending from the strap, a second flange extending from the adjustment bracket and having a threaded bolt mounting hole therein, and a threaded bolt coupled to the first flange for rotatable movement but preventing lateral movement of the threaded bolt along a longitudinal axis and threadably coupled to the second flange bolt mounting hole. With this construction, threaded movement of the threaded bolt causes relative movement between the first and second flanges, and thereby relative movement between the adjustment bracket and the strap.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a front view of an anti-sag hinge embodying principles of the invention in a preferred form

FIG. 2 is a top view of the anti-sag hinge of FIG. 1, shown in partial cross-section.

FIG. 3 is a perspective view of a portion of the anti-sag hinge of FIG. 1.

FIG. 4 is an exploded view of the anti-sag hinge of FIG. 1.

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FIG. 5 is a cross-sectional view of a bushing of the anti-sag hinge of FIG. 1.

FIG. 6 is a perspective view of the cam follower of the anti-sag hinge of FIG. 1.

FIG. 7 is a perspective view of the spacer of the anti-sag hinge of FIG. 1.

DETAILED DESCRIPTION

With reference next to the drawings, there is shown a lift-off type anti-sag hinge **10** according to the present invention. The hinge **10** includes a mounting flange assembly **12** pivotally coupled to a strap assembly **15**. It is to be appreciated that the hinge **10** shown in the drawings is configured for use with a walk-in refrigerator or freezer door. The jamb and doors are well-known in the art and need not be disclosed further herein. It is to be further appreciated that the hinge **10**, either alone or in combination with another hinge in accordance with the present invention, support a door (not shown) in the usual manner.

The mounting flange assembly **12** includes a metal mounting plate **16** having four mounting holes **17** therethrough adapted to receiving unshown mounting bolts or screws, and a metal lower hinge flange **18** extending from the mounting plate **16**. As used throughout the entire disclosure herein, the terms screw and bolt are used interchangeably. The lower hinge flange **18** includes a cam recess **19** configured to receive an internally mounted cam **20** which enables the hinge to be a riser type hinge, although this is merely an option of the present invention. The cam **20** includes a dual sloped camming surface **21**. The cam **20** and later described cam follower are preferably made of a smooth, low-frictional plastic material such as nylon. The lower hinge flange **18** also includes a shoulder bolt hole **22** therethrough in which is mounted a shoulder bolt or rod **25**.

The strap assembly **15** includes a metal elongated strap **31** extending from a cylinder portion **32**. The term cylinder portion **32** is meant to describe the enlarged casing located at the end of the strap and the encased bearings, spring, and cam described in more detail hereinafter. The term cylinder portion is not intended to be limited to a cylinder shape, as this portion or parts of this portion may be of many known shapes and are not necessarily cylindrical in shape.

The cylindrical portion **32** includes a coupling end **34** with a vertically extending octagonal channel **35** therethrough. The octagonal channel **35** includes a vertically extending alignment ridge or tongue **36** and a centrally positioned, horizontally oriented, annular ridge **37**. A cap **38** is pressed into and seals the top opening of the channel **35**. The cylindrical portion **32** also includes an elongated cam follower **40** having a lower cam follower portion **41** and an upper ear follower portion **42**. The lower cam follower portion **41** has an octagonal exterior surface **43** terminating at a circumferential ledge or shoulder **44** positioned to abut and bear against the centrally positioned annular ridge **37** of the coupling end **34**. It should be noted that the coupling end octagonal channel **35** is longitudinally symmetric about the centrally positioned annular ridge **37** so that the cam follower **40** may be positioned in either end, thereby making it reversible (either left hand or right hand door configurable) so that the cam follower may fit in the octagonal channel **35** from either open end. The lower ear follower portion **41** also has an interior surface **46** with a cam following surface **47** configured to mesh or mate with the camming surface **21**. The cam following surface **47** includes a low point **48** flanked on either side by symmetrical incline surfaces which terminate at a common dwell surface. The symmetry allows the cam follower to rise with rotation in

either direction so that the hinge may be mounted to both right hand and left hand opening doors. The lower follower portion **41** also has a longitudinally extending slot or groove **53** configured to receive the coupling end alignment tongue **36**. The groove **53** has a camber **54** in the ledge **44** which aids in initially guiding the tongue **36** into the groove. The groove **53** is aligned along the exterior surface directly opposite the low point **48**, so that the groove **53** extends into or corresponds to the longest portion of the camming surface to allow for the greatest degree of strength or minimizing the weakening of component due to the absence of material created by the groove **53**.

The upper cam follower portion **42** is generally cylindrical with a round exterior surface **55** and a round interior surface **56** defining an interior channel **57** commencing at an interior floor **58**. A bolt or rod hole **59** passes through the center of the cam follower in which resides the shoulder rod **25** so that the cam follower **40** may rotate or pivot about the shoulder rod and relative to the underlying cam **20**.

The strap assembly **15** also includes a compression spring **62** positioned concentrically about the shoulder rod **25** and within cam follower interior channel **56**. A bushing **63** and washer **64**, positioned on top of the bushing **63**, are also positioned concentrically about the shoulder rod **25** and within the cam follower interior channel **56**. The bushing **63** has a peripheral flange **65** with an annular bottom recess **66** configured to receive a topmost portion of the compression spring **62**, which enables the spring **62** to be maintained tightly in position while still allowing lateral room for the spring to expand during spring compression under load, i.e., with the spring under no load there is room between the spring and the interior surface **56** which allows the spring to laterally expand when it is vertically compressed and therefore laterally expanded under a load. The top of the shoulder rod **25** is blunted or deformed to prevent the removal of the washer **64** and thereby the bushing **63** and spring **62**. The compression of the spring **62** biases the cam follower **40** to its lowermost position, which will correlate with the closed position of the refrigerator door, and as such the hinge shown in the drawings is a self-closing type hinge.

The strap **31** includes a large interior well or recess **68** having four elongated mounting holes **69**, an adjustment screw flange, holder or boss **70** having a screw hole or passageway **71** therein, an upper guide **72** and a lower guide **73**. The recess **68** is defined by the sidewalls **74** of the strap **31** which extend to the most outboard portion of the hinge, i.e., a peripheral sidewall **74** which extends outwardly from the underlying door so as to make initial contact with any structure colliding with or impacting upon the hinge. The adjustment screw boss passageway **71** preferably is U-shaped so as to have an open top configuration.

The strap **31** also includes a moveable adjustment bracket **77** mounted for lateral movement relative to the underlying strap **31**. The vertical movement of the adjustment bracket **77** is limited by the upper guide **72** and lower guide **73**. The adjustment bracket **77** also includes an adjustment screw mounting flange **78** having a threaded screw hole **79** therein in which is threadably mounted an adjustment screw **80**. The adjustment screw **80** has a head **81**, a bearing flange **82**, a neck **83** extending between the head **81** and bearing flange **82**, and an externally threaded shaft **84** which is threaded into mounting flange screw hole **79**. A removable spacer **86** is removably mounted to the adjustment screw **80**. The spacer **86** has a U-shaped gripping portion **87** which is snap fitted onto a neck portion of the threaded shaft **84** between the bearing flange **82** and the adjustment bracket screw flange **78**. Lastly, the adjustment bracket **77** includes four mounting holes **88** extending

therethrough and generally in alignment with strap elongated mounting holes **69**. A flexible bumper or cover **90** is configured to fit snugly into the top end of the strap recess **68** to protect and seal the interior of the strap assembly, the bumper may include tabs which fit within corresponding tab holes or grooves in the strap.

In use, the hinge **10** is mounted to the refrigerator or freezer door in the conventional manner as is well known in the art. The mounting plate **16** is secured to the jamb by the use of screws (not shown) that extend through the mounting plate mounting holes **17** and into the jamb. A conventional walk-in refrigerator or freezer door is similarly secured to the hinge **10** by four screws (not shown) that extend through the four mounting holes **88** of the strap assembly adjustment bracket **77** and through the four elongated mounting holes **69** of the strap **31**. The removable spacer **86** is initially positioned so that the adjustment bracket mounting holes **88** are aligned with the strap mounting holes **69**. Once the flange assembly mounting screws are secured and the strap assembly mounting screws are partially secured but not finally tightened, final adjustment of the adjustment bracket may occur to level the door.

To adjust the bracket, the removable spacer **86** is removed and the adjustment screw **80** is rotatably threaded into the threaded hole **79** of the screw adjustment flange **78** to cause relative movement between the adjustment bracket **77** and the underlying strap **31**. This relative movement causes the movement of the door relative to the stationary jamb, as the elongated holes **69** allow relative movement of mounting screws and adjustment bracket. The movement of the door enables the door to be properly aligned. The mounting screws are then fully tightened into the door to prevent further movement of the strap **31**. Moreover, should the door sag over time, the mounting screws are slightly loosened and the adjustment screw is merely threaded to once again cause movement of the door to a properly aligned position, as previously described.

The rotation of the adjustment screw **80** in one direction (clockwise) causes the threaded screw **80** to be threaded further into the screw flange **78** of the adjustment bracket **77**, thereby causing the adjustment bracket **77** to move towards the boss **70**. The rotation of the threaded screw **80** in this direction causes the screw head **81** to bear against the boss **70** to force the lateral movement. The rotation of the adjustment screw **80** in the other direction (counter-clockwise) causes the threaded screw **80** to be threaded further out of the adjustment bracket flange **78**, thereby causing the adjustment bracket **77** to move in a direction away from the boss **70**. The rotation of the threaded screw **80** in this direction causes the screw bearing flange **82** to bear against the boss **70** to force the lateral movement in a direction away from the boss **70**. As such, the bolt is allowed to rotate yet is prevented from moving laterally along the longitudinal axis of the bolt by the contact between the bolt and the boss due to the bolt head and bearing flange bearing upon the boss.

It should be understood that the present invention is an improvement over the prior art shown in U.S. Pat. No. 7,870,642 as the threaded portion in which the adjustment screw is threaded into resides in the removable adjustment plate. This allows the manufacturing of the threads in the mounting hole to occur in a simple manner, as oppose to the prior art which required the threading process to occur on the large, heavy flange of the strap itself, thus complicating the manufacturing process of the hinge and causing a great deal of problems if the threads were not properly formed. Furthermore, if the threads become stripped or damaged only the adjustment bracket needs to be replaced rather than the entire hinge strap.

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It should also be understood that the open channel or passageway 71 of the boss allows for the ease of positioning the adjustment bracket by simply dropping the adjustment screw neck 83 into the boss wherein the spacer is utilized to maintain the position of the adjustment screw.

While this invention has been described in detail with particular reference to the preferred embodiments thereof and the best mode of practicing same, it will be understood that variations and modifications can be effected within the spirit and scope of the invention as described herein above and as set forth in the appended claims.

The invention claimed is:

1. An anti-sag hinge comprising, a mounting flange assembly, and a strap assembly pivotally coupled to said mounting flange assembly, said strap assembly including a strap having at least one strap mounting hole, an adjustment bracket coupled to said strap for relative movement therebetween and having at least one bracket mounting hole alignable with said at least one strap mounting hole, and an adjuster coupled to said strap and said adjustment bracket, said adjuster being capable of varying the position of said adjustment bracket relative to said strap wherein said adjuster includes a first flange extending from said strap, a second flange extending from said adjustment bracket and having a threaded bolt mounting hole therein, and a threaded bolt coupled to said first flange for rotatable movement but preventing lateral movement of said threaded bolt along a longitudinal axis and threadably coupled to said second flange threaded bolt mounting hole, whereby threaded movement of the threaded bolt causes relative movement between the first and second flanges, and thereby relative movement between the adjustment bracket and the strap.

2. The anti-sag hinge of claim 1 wherein said threaded bolt has a head positioned to abut one side of said first flange and a bearing flange positioned to abut an opposite side of said first flange.

3. The anti-sag hinge of claim 2 further comprising a removable spacer mounted to said threaded bolt between said threaded bolt bearing flange and said second flange.

4. The anti-sag hinge of claim 1 wherein said first flange has an open passageway configured to removably receive said threaded bolt.

5. An anti-sag hinge comprising, a mounting flange assembly, and a strap assembly pivotally coupled to said mounting flange assembly, said strap assembly including a strap having door mounting holes therein and an adjustment flange, an adjustment bracket coupled to said strap for relative lateral movement therebetween, said adjustment bracket including a threaded adjustment mounting hole therein, and an adjuster having an elongated shaft threadably coupled to said strap

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adjustment flange to prevent longitudinal movement therebetween and including a threaded portion threadably received within said adjustment bracket threaded adjustment mounting hole, said adjuster being capable of varying the position of said adjustment bracket relative to said strap via rotational movement of said adjuster, and wherein said adjustment bracket includes door mounting holes aligned with said strap elongated door mounting holes.

6. The anti-sag hinge of claim 5 wherein said adjuster is a threaded bolt having a head positioned to abut one side of said strap adjustment flange and a bearing flange positioned to abut an opposite side of said strap adjustment flange.

7. The anti-sag hinge of claim 6 further comprising a removable spacer mounted to said threaded bolt between said threaded bolt bearing flange and said adjustment bracket.

8. The anti-sag hinge of claim 6 wherein said adjustment flange has an open passageway configured to removably receive said threaded bolt.

9. An anti-sag hinge comprising, a mounting flange assembly, and a strap assembly pivotally coupled to said mounting flange assembly, said strap assembly including a strap having at least one strap door mounting hole, an adjustment bracket coupled to said strap for relative movement therebetween and having at least one bracket door mounting hole alignable with said at least one strap door mounting hole, and an adjuster coupled to said strap and said adjustment bracket, said adjuster being capable of varying the position of said adjustment bracket relative to said strap wherein said adjuster includes a first flange extending from said strap, a second flange extending from said adjustment bracket and having a threaded bolt mounting hole therein, a threaded bolt coupled to said first flange for rotatable movement, and a removable spacer mounted to said threaded bolt between said first flange and said second flange, said spacer being of a size which aligns said bracket door mounting hole with said strap assembly door mounting hole, whereby the spacer is utilized to maintain the alignment of the adjustment bracket with the strap during the mounting process and subsequently removed during the adjustment process of the anti-sag hinge.

10. The anti-sag hinge of claim 9 wherein said threaded bolt has a head positioned to abut one side of said first flange and a bearing flange positioned to abut an opposite side of said first flange.

11. The anti-sag hinge of claim 9 wherein said threaded bolt is threadably coupled to said second flange bolt mounting hole.

12. The anti-sag hinge of claim 2 wherein said first flange has an open passageway configured to removably receive said threaded bolt.

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